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Dendronised Polymer Architectures for Fuel Cell Membranes

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Hydrogen powered Proton Exchange Membrane (PEM) Fuel Cell cars are scheduled for large-scale commercial launch in 2015 [1]. The current PerFluoroSulfonic Acid (PFSA) benchmark membranes need significantly improved performance, cost and durability for the technology to become viable. In an attempt to take a less travelled road, the current study investigates some alkylic dendronised architectures as PEM candidates. Sulfonated dendritic structures are covalently attached by the efficient copper catalyzed azide-alkyne cycloaddition (CuAAC) [2] to a non-fluorous polysulfone (PSU) backbone that has been modified to contain an azidomethyl group at three different degrees of substitution (as illustrated in Figure 1). All compounds are subsequently characterized by ^{1}H NMR and FT-IR spectroscopy. Initial proton conductivity measurements under wet conditions at room temperature show the potential of the concept. The study comprises a general comparison of sulfonation carried out before and after the CuAAC respectively.

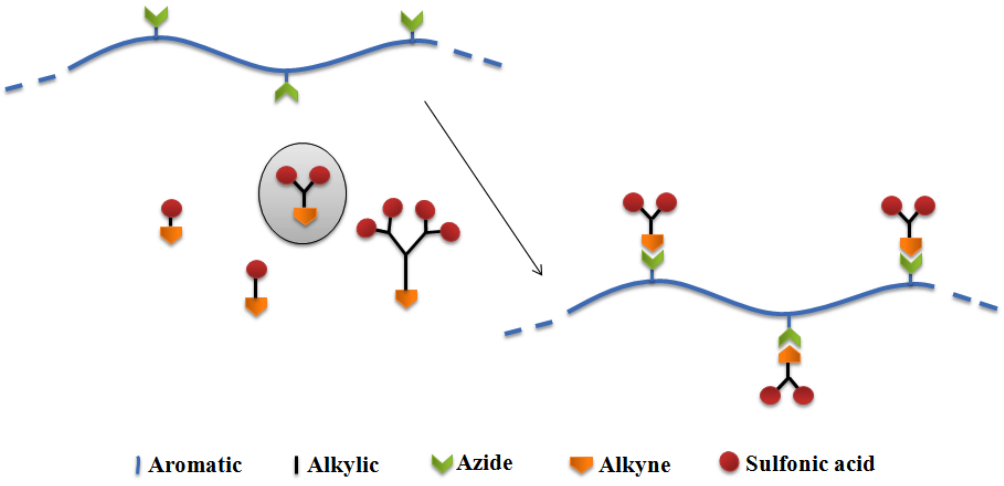

Figure 1. Attachment of various side chains onto modified polysulfone by "click" chemistry.

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